Making Literacy Accessible for Students with Physical Disabilities Through the Use of AT

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Session Description

Making Literacy Accessible for Students with Physical Disabilities

Students with physical disabilities face many barriers that may impede progress in literacy including reduced access to materials, different background experiences, and health and physical factors such as fatigue and limited endurance. During this session, strategies for making reading and writing accessible for students with physical disabilities will be presented. Solutions from low technology to high technology will be provided with an emphasis on computer access and incorporating the use of augmentative communication devices into literacy activities. AT solutions for reading will include adapting books, providing electronic access to text, using software to target specific reading skills. AT solutions for writing include low tech solutions for handwriting, adapted input devices for computer access, and software to enhance written expression. Participants also will learn about an instrument for recording and tracking classroom adaptations, including assistive technology, for students with physical disabilities.

- Session participants will be able to:
  - Identify at least four barriers that may inhibit progress in literacy for students with physical disabilities and possible solutions to those barriers
  - List six (or more) examples of assistive technologies that promote access to text or that promote increased writing for students with physical disabilities
  - List three (or more) examples of how augmentative communication devices can be incorporated into literacy activities
Barriers to Literacy

1. Type of physical disability
2. Motor limitation
3. Restricted communication
4. Health factors, fatigue & endurance
5. Experiential deficits & differences in concept development
6. Interaction of additional disabilities
7. Psychosocial & environmental factors
Overcoming Barriers
Issues with AT Implementation

• 2/3 of AT devices are abandoned within the first year after purchase! (Bryant & Bryant, 2002).

• AT abandonment for students with physical disabilities:

  • Reasons
    • Inadequate assessment
    • Inadequate training
    • Inconsistent use
    • Lack of ongoing support and data collection
    • Attitudes toward technology
    • Device takes too much effort and time
Baker’s Basic Ergonomic Equation

- Developed in light of computer-human interactions (Baker, 1986)
- Modified by King (1999) to fit AT

Motivation of AT user to pursue and complete a task = Successful or unsuccessful AT use
Physical effort + Cognitive effort + Linguistic effort + Time load
How do we build motivation to complete tasks using AT?

• Rationale

• R+

• Shaping
Tools to Use for Planning Literacy Instruction or AT Implementation for Students with Physical Disabilities

• **Literacy Profile for Students with Physical Impairments**

• **Classroom Modification Checklist**

(Available at: [http://education.gsu.edu/PhysicalDis/mono.html](http://education.gsu.edu/PhysicalDis/mono.html))

• **Assistive Technology Checklist: Curriculum Access for Students with Physical Disabilities**

Assistive Technology Checklist: Curriculum Access

- Designed to guide you through considering assistive technology services, needs, and devices to facilitate access to academic curricula for students with physical disabilities.

- SECTIONS
  - Services & Needs
  - Assistive technology devices that may provide access across curriculum areas for students with physical disabilities.
  - Assistive technology for specific curriculum areas.

- Not an exhaustive list, but might be a good start.
### Assistive Technology Services / Needs to Address

#### Assessment
- AT Framework (e.g., SETT Framework) completed. Notes: __________________________
- Formal assessment of AT needs (optional) completed. Notes: _______________________
- Trials with device(s) completed. Notes: _______________________________________

#### Training
- All school personnel who will interact with the student’s device have received training on device operation and programming. Personnel who are trained: ___________________________
- All school personnel who will interact with the student’s device have received training on ways to incorporate the device into the student’s daily activities. Notes: ___________________________
- Student has been trained to use the device including rationale for use and basic device maintenance. Notes: ___________________________
- Student’s family members have been trained to use the device. Notes: ______________________

#### Implementation
- Devices that may increase curriculum access or skills in the student’s next environment have been considered: ___________________________
- Ongoing data are being collected to ensure that the device is meeting the student’s needs. Types of data/notes: ___________________________
- Device training occurred before implementation or consideration is made for academic work completed with the device. Additional training needs: ___________________________
- Device is being used consistently. If not, strategies for increasing consistent use: ___________

#### Psychosocial, Cultural and Environmental Factors
- Attitudes toward technology for student, family, and personnel have been considered. Strategies to address attitudes: ___________________________
- Student’s family has been included in AT process and cultural values have been considered. Notes and strategies: ___________________________
- Attempts to reduce stigma of device have been made (e.g., peer training, peer helpers). Notes: ___________________________
- Environmental factors such as space, electrical outlets, and portability across settings have been addressed. ___________________________
- Student’s motivation to use the device has been addressed. Reinforcers and reinforcement schedule are in place (including plan to fade reinforcement): ___________________________
- The amount of physical, cognitive, linguistic effort and time needed to use the device has been considered. Strategies for decreasing effort and time: (e.g., additional training, strength building through practice) ___________________________
AT Across Curriculum Areas

• **Physical Support (No Tech & Low Tech Solutions)**
  • Changes to position of desk or materials (e.g., higher desk, materials positioned to student’s dominant side).
  • Materials placed on a slanted surface.
  • Nonslip material placed under materials for stabilization (e.g., Dycem)
  • Positioning or seating equipment used to promote stabilization during academic work (e.g., roll placed under arms, student positioned in stander or feeder seat used during reading).

• **Vision (Low – High Tech Solutions)**
  • Text enlarged using word processing software or copier
  • Large print materials ordered from an outside source
  • Handheld magnifiers (nonelectronic or lighted)
  • Electronic magnifiers (e.g., Closed Circuit Television)
  • Computer access: accessibility features (e.g., magnifier, larger cursor)
  • Computer access: Screen enlargement software (e.g., ZoomText)
  • Computer access: Screen reading software (e.g., JAWS)
  • Audio text on CD, MP3, or specialized device (e.g., Victor Reader)
  • Braille devices: nonelectronic or electronic
AT to Promote Access to Literacy for Students with Physical Disabilities

- Across Curriculum Areas
  - Computer Access
  - Communication (*Last)
- Reading
- Writing
### Computer Access: AT for Physical Access to the Computer

- Student does not need AT to access a computer for academic purposes (skip to next section).
- Student does require AT to access a computer. Possible solutions:
  - Changes to position of monitor and/or keyboard (e.g., lower monitor, keyboard placed on slanted surface).
  - Accessibility features (e.g., Sticky Keys, Filter Keys, mouse cursor slowed down).
  - Low tech devices used to assist with computer access (e.g., handpointers, headpointers, mouthsticks).
  - Adaptive keyboard (e.g., smaller, larger, onscreen).
  - Hand-controlled adaptive input devices (e.g., trackballs, joysticks, trackpads).
  - Head-controlled input device (e.g., SmartNav) or eye tracking input system.
  - Switches with scanning software (e.g., switch with switch interface and ScanBuddy software).
AT for Computer Access
Low Tech Devices for Access

- **Adaptive Pointers**
  - Hand pointer
  - Mouth stick
  - Head pointer
  - Arm and Wrist Supports
Keyboard Add-ons

- Keyguards
  - Useful for less controlled movements or difficulty with finger isolation.
  - Keeps students from hitting multiple keys.

- Moisture Guard
  - Useful for students with poor oral motor control or for young children.

- Key Labels
  - Visual clarity (Available in black on white, white on black, caps, lowercase)
  - Tactile information
Alternate Keyboards

- Ergonomic Keyboards
- Alternate Keyboards
  - Reduced Size Keyboards
  - Expanded Keyboards
  - One-Handed Keyboards
  - Chorded Keyboards
- On-screen Keyboards
Mouse Alternatives: Direct Select

- Mouse Alternatives
  - Trackpoint
  - Trackpad
  - Trackball
  - Joystick
  - Eyegaze or eye-tracking
  - Head-controlled devices
Directed Selection & Scanning

- **Directed selection**: making choices by moving the cursor towards the selection choice in more than one movement
  - Usually not as quick as direct but for some users it may be significantly more accurate.

- **Scanning**: presentation of choices one at a time or in a pattern until the user indicates that the desired choice has been reached.
Onscreen Keyboard Options

• QWERTY
• ABC
• *Split ABC (Head-controlled ME)
• *High Frequency (Scanning)
AT for Reading
<table>
<thead>
<tr>
<th>Specific Curriculum Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reading: AT for Access to Reading Curriculum</strong></td>
</tr>
<tr>
<td>□ Student does not need AT to access reading curriculum or reading activities (skip to next section).</td>
</tr>
<tr>
<td>□ Student needs AT to access reading curriculum or reading activities. Possible solutions (check all that apply):</td>
</tr>
<tr>
<td>□ Low tech reading devices (e.g., page fluffers, slant boards, reading guides, Color Line Prompting Strategy)</td>
</tr>
<tr>
<td>□ Auditory access to text on handheld devices (e.g., MP3 player, Victor Reader)</td>
</tr>
<tr>
<td>□ Computerized text for physical access (e.g., PowerPoint book, My Own Bookshelf)</td>
</tr>
<tr>
<td>□ Text-to-speech software (e.g., Kurzweil 3000, Read:OutLoud)</td>
</tr>
<tr>
<td>□ Screen reading software (e.g., Read and Write Gold)</td>
</tr>
</tbody>
</table>
Low Tech AT for Reading Access

• Stabilization or positioning of materials
  • Dycem
  • Slant Board

• Magnifiers

• Page Turners (nonelectronic)

• Book Modifications
  • Page Fluffers
  • Other book modifications

• Book Additions
  • Reading Guides/ Typoscope
  • Color Line Prompting Strategy
Low Tech AT for Reading

- Color Line Prompting Strategy

- [http://education.gsu.edu/PhysicalDis стратегий чтения.html](http://education.gsu.edu/PhysicalDis/strategies/reading.html)

The boy then turned and saw his friend holding his puppy. He was so happy that his lost puppy was found. Tears began to swell in his eyes. He now knew how much the puppy meant to him and how he would always take good care of him.
Fading to using one color line of every two lines of print:

The boy then turned and saw his friend holding his puppy. He was so happy that his lost puppy was found. Tears began to swell in his eyes. He now knew how much the puppy meant to him and how he would always take good care of him.

Fading the color line:

The boy then turned and saw his friend holding his puppy. He was so happy that his lost puppy was found. Tears began to swell in his

Further fading the color line:

The boy then turned and saw his friend holding his puppy. He was so happy that his lost puppy was found. Tears began to swell in his
Mid/High Tech AT for Reading

- Kindle – physical & visual access, some books speak
- Recorded Text
  - Tape Players
  - CD Players
  - MP3 Players
- Specialized Devices
  - Talking Book Players that require high tech (connect to computer)
    - Victor Reader
    - Classmate Reader
AT for Reading: Physical Access

- Electronic Page Turners
AT for Visual Access to Print

- Video Magnifiers (CCTV)
  - Change Size
  - Change Contrast
  - Use for pictures or objects as well as text
Computerized Visual Access: Screen Enlargement & Speech Output

- Screen Enlargement
  - Built in magnifier
  - ZoomText (also speaks)

- Speech Output
AT for Access to Reading: Computerized Text (etext)

- Computerized Books
  - Commercially available
  - Free sources of text
  - Teacher-made books
    - Classroom Suite or other program
    - PowerPoint
PowerPoint Examples

http://web.utk.edu/~mbc/Pow""""erPoint

Sheep
AT for Reading Comprehension

- Single Word
  - Reading Pen

- Text Readers that highlight text as it is spoken promote learning of word-to-word correspondence
  - Kurzweil 3000
  - Wynn
  - ReadPlease
  - Others (PPT, ebooks)
Computerized Accessible Books for Fluency and Comprehension

- PowerPoint Books
- Living Books, Ukandu, and others (e.g. Dr. Seuss)
- Start-to-Finish Books
- Other options for Etext
  - RFB&D
  - Bookshare
  - Project Gutenberg
Sources of etext

• http://www.rfbd.org/alt/

• http://www.bookshare.org/

• http://www.gutenberg.org/
ReadPlease

• [http://www.readplease.com/](http://www.readplease.com/)

• Reads any text you paste into it. All purpose text-to-speech software. FREE!

  • Copy and paste text from Project Gutenberg into ReadPlease
AT for Writing
Writing: AT for Access to Writing Curriculum

- Student does not need AT to access writing curriculum or writing activities (skip to next section).
- Student needs AT to access writing curriculum or writing activities. Possible solutions (check all that apply):
  - Low tech writing devices (e.g., pencil grips, weighted pencils, slant boards)
  - Portable word processors (e.g., Alphasmart)
  - Standard word processor in lieu of handwriting (e.g., Microsoft Word) including options such as abbreviation expansion (done with autocorrect feature)
  - Software to access worksheets (e.g., PDF Annotator, PaperPort)
  - Talking or symbol word processors to help with writing process (e.g., Write:OutLoud, Symwriter)
  - Word prediction to reduce keystrokes or to improve spelling and grammar (e.g., Co:Writer)
  - Graphic organizer software to increase written production (e.g., Inspiration, Draft:Builder)
  - Speech-to-text software for physical access or to increase written expression (e.g., Dragon Naturally Speaking)
No & Low Tech AT for Handwriting

• **Pencil/Pen Use**
  • Holds pencil/pen in a modified fashion
    • Foot, mouth
    • Headstick, mouthstick
  • Needs particular writing tools (e.g. felt tip)

• Adapted writing tools
  • Weighted, larger grip surface, brace
AT for Handwriting, Cont.

- Adapted paper (larger spacing, darker lines, raised lines)

- Paper stabilization/ Positioning
  - Slant board
  - Clip board

School Fonts

- AbcPrintDottedLined
- AbcPrintLined
AT for Handwriting, Cont.

- Alternatives to handwriting
  - Magnetic words and letters
  - Label makers
  - Letter stencils
  - Letter and name stamps
Low Tech: Eye Gaze for Writing

- Coleman-Martin, M. B., & Heller, K. W. (2004b). Using an eye gaze board with encoding for written expression or communication for students with severe speech and physical impairments. Online article, *Georgia Bureau for Students with Physical and Health Impairments Website*, from
  - [http://education.gsu.edu/physicaldis/using_an_eye_gaze_board_with_enc.htm](http://education.gsu.edu/physicaldis/using_an_eye_gaze_board_with_enc.htm)
Mid Tech AT for Writing

• Dictating
  • Tape player
  • Digital recorder
Mid Tech AT for Writing

• Handheld Dictionaries/Spellers
  • Franklin Speller
    • Recognizes approximations
    • Definitions
    • Auditory output
Mid Tech AT for Writing

- Portable Word Processors
  - Access to writing & notetaking
Computer Access for Writing

• Accessibility Features
  • Sticky keys, filter keys

• Keyboard Modifications

• Alternative Keyboards

• Speech Recognition
Physical Access to Documents

- PDF Manipulation software
  - Paperport
  - PDF Annotator
Writing Access: Word Processors

• Standard Word Processors
  • Microsoft Word, Microsoft Works
    • Features that help with access and writing process

• Assistive Word Processors: Talking/Symbol Word Processors
  • Write Out Loud, IntelliTalk, Writing With Symbols
    • Help with writing process
Standard Word Processors:

- Features for access
  - Template
  - Auto Correct (Abbreviation Expansion)
  - Find/Replace
  - (Word count)

- Features for written production—
  - Auto Correct
  - Spell and Grammar checks
  - Word Count/Writing Level
  - Dictionary and Thesaurus
  - Grammar Settings
Adaptive Word Processing

- **Word Prediction**
  - Originally developed to speed word processing for individuals with physical disabilities
  - Mixed findings in research
  - May significantly reduce keystrokes and fatigue
AT for Written Expression

- Graphic Organizers
- Especially helpful because of difficulties with concept development
AT for Communication: AAC and Literacy
AT for Communication

- Augmentative and Alternative Communication (AAC)

<table>
<thead>
<tr>
<th>Communication: AT for Curriculum Access or Participation in Classroom Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Student does not have communication needs that require AT (skip to next section).</td>
</tr>
<tr>
<td>□ Student does have communication needs that require AT. Possible solutions (check all that apply):</td>
</tr>
<tr>
<td>□ No tech solutions such as signing or gestures.</td>
</tr>
<tr>
<td>□ Low tech communication devices (e.g., picture boards, flip books) or mid tech communication devices (e.g., BigMack, GoTalk) to provide the student with quick access to frequently used words and phrases.</td>
</tr>
<tr>
<td>□ High tech communication devices (e.g., Dynavox, laptop with Speaking Dynamically Pro software) to meet multiple communication needs.</td>
</tr>
<tr>
<td>□ Low, middle, or high tech communication device with questions and comments for classroom participation.</td>
</tr>
<tr>
<td>□ Low, middle or high tech communication device with activity-specific vocabulary and phrases.</td>
</tr>
</tbody>
</table>
Using AAC for Literacy

- Responding to questions
- Participation in literacy activities
- Literacy activities on high tech devices
AT for Literacy: Communication

• FIRST....

• **Reliable Means of Response (RMR)**
  How will student respond? If student has limited verbal abilities, must determine most reliable, consistent means of response.

  • Determine by:
    • 1) consistency of response
    • 2) isolated movement
    • 3) least fatiguing
    • 4) ability to see target & touch/access it
    • 5) secondary RMR
Reading Strategy for Students with Complex Communication Needs

• Nonverbal Reading Approach

• Teaches the students a strategy for decoding using internal speech
  • Say each sound
  • Say the sounds slowly together
  • Say the sounds fast (entire word)

• Provides a method for assessment of words through diagnostic distractor arrays

• Instructions available on Georgia Bureau for Students with Physical and Health Impairments website:
Responding to Instructional Requests

• One choice

  yes

• Choice arrays

  dig   log   dog   doll

  A      B      C

• Multiple responses

  yes  no  I don't know
Participating in Literacy Activities

• Single word/phrase
  • Participation: “My turn,” “I want it”
  • Phrase in repetitive book: “…what do you see?…”

• Levels of words/phrases
  • Brown Bear..... “I see a yellow duck...” “I see a red bird...”

• Multiple words/phrases
*Initiate

*Group participation

*Assistance

*Clarification

*Comments/ask others
AAC Reading Activities

- General Reading Page
- Book Activities
- Word Recognition/Decoding
  - Sight words
  - Picture dictionaries
  - Word walls
  - Phonemic awareness
  - Phonics
- Reading Fluency
- Reading Comprehension
AAC Writing Activities

• Spelling/ single word
• Sentence construction
• Passage construction
THANK YOU FOR ATTENDING!

If you have questions:

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Resources:
My site: http://web.utk.edu/~mbc

Bureau site: http://education.gsu.edu/PhysicalDis